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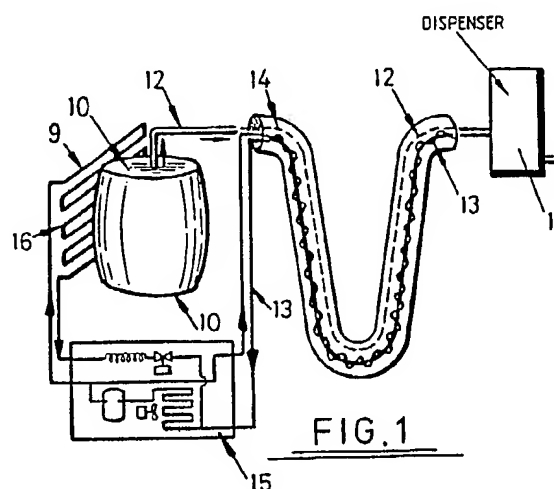
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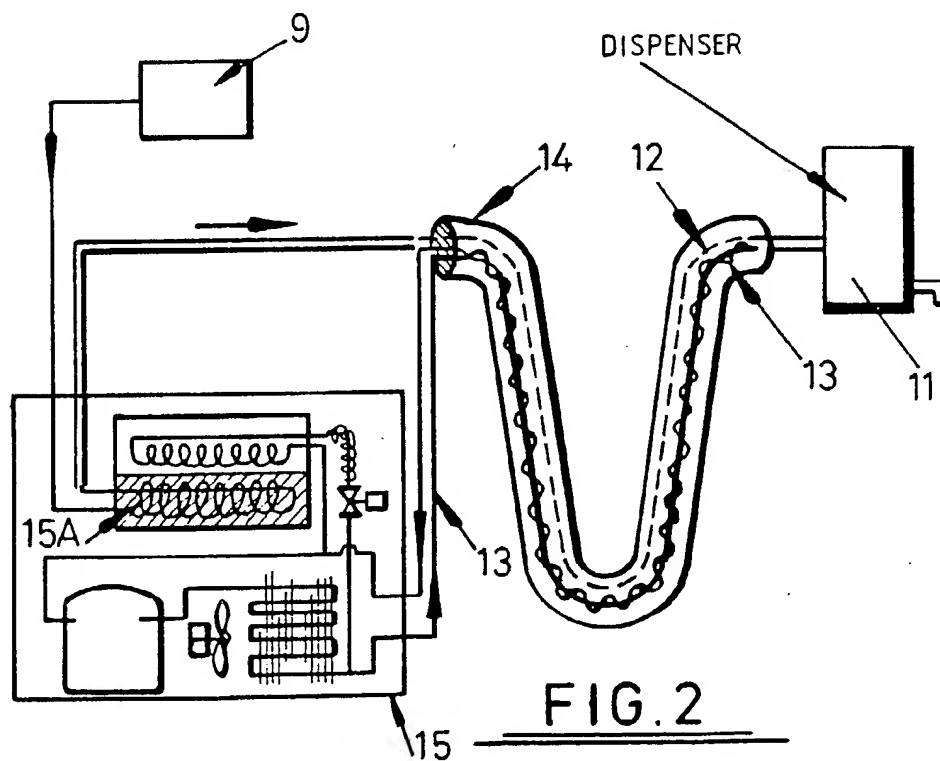
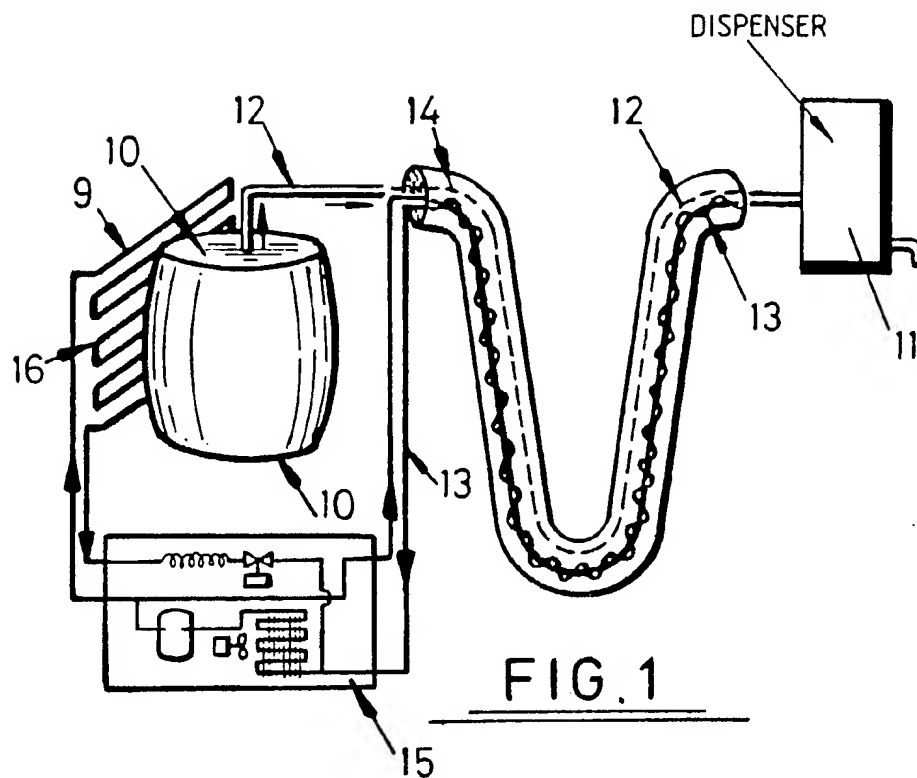
(54) A liquid dispensing system

(57) A liquid, e.g. beer, dispensing system comprises a barrel (10) delivering the liquid via tube (12) to a dispenser (11). A refrigeration system (15) utilising volatile coolant fluid operates a coolant coil (16) which is wound around barrel (10) and a U-shaped conduit (13) which extends alongside tube (12). Tube (12) and conduit (13) are housed in a thermally insulating sleeve (14).



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SPECIFICATION

Apparatus for conveying liquids

5 This invention relates to apparatus for conveying liquids, especially potable liquids.

Potable liquids such as beer, lager, fruit juices, milk and the like require to be dispensed at or about a particular temperature if the taste of the liquid is to be at
10 its best. For example, it is known that beers taste best at a temperature of about 54°F whereas lager tastes best at a temperature of about 48°F.

At the present time, where potable liquids are stored in bulk, it is the practise to cool the bulk liquid to
15 the relevant temperature and thereafter to convey it to a dispenser through a tube. The tube may be one of a number collected together and housed in a thermally-insulating sleeve and the length of the tube may vary greatly from as little as a few feet to as
20 much as 100 yards or so. Furthermore, the tube may pass close to a variety of heat-emitting devices so that by virtue of length and/or location of the tube the temperature of the liquid at the dispenser is relatively uncontrolled despite the close control of tem-
25 perature at the bulk store.

In a known arrangement the tube is one of a bundle housed in a thermally-insulating sleeve which additionally contains flow and return pipes for recirculation of chilled water, the chilled water being continuously supplied from an ice-bank reservoir. In this
30 arrangement, known as a 'python', the chilled water is at a temperature of about 34°F and very large quantities of water are involved in order to maintain the potable liquids at or about their required dispense
35 temperatures during conditions when the liquids are being regularly dispensed, but the same amount of water circulates when no potable liquids are being dispensed which gives rise to under-cooling of at least that volume of potable liquid held within the
40 python.

It is an object of the present invention to provide an improved apparatus for conveying liquids from a bulk store to a dispenser.

According to the present invention there is provided
45 apparatus conveying liquids from a bulk store to a dispenser, said apparatus comprising at least one tube for carrying the liquid to be dispensed, the tube being housed together with conduit means in a thermally-insulating sleeve, said conduit means
50 carrying a volatile coolant fluid supplied to the conduit means by a refrigeration system.

Conveniently the volatile coolant fluid is R12.

The conduit means may take the form of a heat pipe or may take the form of a U-shaped pipe. In the
55 latter case the limbs of the U-shaped pipe may be of equal cross-sectional area or may differ in cross-sectional area. By way of example one limb of the U-shaped pipe may be of sufficiently small cross-sectional area to function as a capillary. The free
60 ends of the U-shaped pipe may be terminated with quick-release pipe couplings for interconnection with the refrigeration system. One limb of the U-shape may be located inside the other or may be wound helically around the outside of the other.

65 Conveniently the refrigeration system incor-

porates at least one coolant coil arranged to control the temperature of a bulk store of the liquid, said tube for carrying the liquid being coupled between said store and a dispenser. It is preferred that the refrigeration system be that disclosed in U.K. Patent 2099979 since such a system has a very short duty cycle.

Conveniently the apparatus is manufactured in predetermined lengths with the conduit means having cross-sectional dimensions determined by said
75 length and by the refrigeration system in order to provide for temperature maintenance only of liquids standing in said tube.

In another form the conduit means may be in the form of a heat pipe which preferably is inclined to
80 allow flow of the coolant fluid under gravity.

Embodiments of the present invention will now be described by way of example with reference to the accompanying schematic drawing in which:

Figure 1 illustrates a first embodiment; and

85 *Figure 2* illustrates a second embodiment.

As is illustrated in *Figure 1* a beer barrel 10 forms part of a bulk store of beer 9, (in the interests of clarity only one beer barrel is shown) which is to be dispensed at dispenser 11, beer being transported between barrel 10 and dispenser 11 by means of a
90 plastic tube 12. The tube 12 is many metres in length and, in accordance with the present invention, substantially the entire length of the tube 12 is housed together with a copper conduit arrangement 13 in a thermally insulating sleeve 14. Sleeve 14 may conveniently be made of foam rubber or polystyrene. The conduit arrangement 13 is in the form of a U-shaped pipe connected to a refrigeration system 15 and is filled with a volatile coolant fluid such as R12.
100 Also, refrigeration system 15 supplies a coolant coil 16 with volatile coolant fluid, coil 16 being located at the bulk store and in the vicinity of barrel 10 in order to maintain the beer therein at a predetermined temperature. In order to provide the appropriate restriction of flow rate of the volatile coolant fluid, arrangement 13 and coil 16 preferably incorporate sections which are capillary and it will be understood that arrangement 13 is dimensioned to provide for temperature maintenance only within the length of
105 sleeve 14 whereas coil 16 is designed for achieving a controlled temperature of beer within the bulk store and thermostatic operation of the refrigeration system 15 is effected via coil 16 to provide rapid cycling of system 15 since prolonged running would tend
110 to freeze the beer in tube 12. Thus, when beer is dispensed at dispenser 11 a small bleed of coolant fluid flows along conduit arrangement 13 caused by coil 16 driving the refrigeration system 15 to its ON condition and temperature maintenance of tube 12 is
115 achieved and continues even when system 15 is in its OFF condition due to the balancing flow of coolant fluid from the high side to the low side of the system 15.

In the *Figure 2* system refrigeration system 15 is local to the dispenser 11 and incorporates a local product cooling coil 15A in which beer to be dispensed is cooled and the tube 12 is only one meter or so in
125 length. In this system beer is delivered from the bulk store 9 to product cooling coil 15A at any convenient temperature, such as by the *Figure 1* python arrange-
130

ment or by the conventional water-cooled python arrangement, and the principal cooling effect is undertaken by coil 15A in order to bring the product to the desired final temperature. Arrangement 13, as before, is designed for temperature maintenance only within the length of sleeve 14. In the Figure 2 system the cooling requirement imposed upon the refrigeration system 15 is small so that the bulk of the system 15 is small.

10 CLAIMS

1. Apparatus for conveying liquids from a bulk store to a dispenser, said apparatus comprising at least one tube for carrying the liquid to be dispensed, the tube being housed together with conduit means in a thermally-insulating sleeve, said conduit means carrying a volatile coolant fluid supplied to the conduit means by a refrigeration system.
2. Apparatus as claimed in claim 1, wherein the volatile coolant fluid is R12.
3. Apparatus as claimed in either preceding claim, wherein the conduit means comprises a U-shaped pipe.
4. Apparatus as claimed in claim 3, wherein the two limbs of the U-shaped pipe are of different cross-sectional areas.
5. Apparatus as claimed in claim 4, wherein one limb of the U-shaped pipe is sufficiently small in cross-sectional area to function as a capillary.
6. Apparatus as claimed in any preceding claim, wherein the refrigeration system incorporates at least one coolant coil arranged to control the temperature of a bulk store of the liquid, said tube for carrying the liquid being coupled between said store and a dispenser.
7. Apparatus as claimed in claim 1 and substantially as hereinbefore described with reference to the accompanying drawing.

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